This listing of claims will replace all prior versions and listings of claims in the Application.

LISTING OF CLAIMS:

Claims 1-20. ***Cancel without prejudice or disclaimer***

21. (*New*) A system for measuring an opacity value for an exhaust emission plume, the system comprising:

a source of electromagnetic radiation that is directed through an exhaust emission plume;

a detector that detects the electromagnetic radiation and outputs a detector signal proportional to the detected electromagnetic radiation; and

a processor that receives the detector signal and calculates an opacity value for the exhaust plume based, at least in part, upon the detector signal.

22. (*New*) The system of claim 21, wherein the source of electromagnetic radiation further comprises:

one or more sources that emit electromagnetic radiation in a first wavelength region, a second wavelength region and a third wavelength region.

23. (*New*) The system of claim 22, wherein the first wavelength region is substantially in the infrared region, the second wavelength region is substantially in the visible region, and the third wavelength region is substantially in the ultra-violet region.

24. (*New*) The system of claim 22, wherein the detector is enabled to detect electromagnetic radiation in each of the first, second and third wavelength regions and outputs a signal proportional to a detected intensity at each of the first, second and third wavelength regions; and wherein the processor further comprises a comparison module that compares the detected intensity of each of the first, second and third wavelength regions.

25. (*New*) The system of claim 24, wherein the processor further comprises an opacity determination module that determines an opacity value proportional to the change in intensity for the detected intensity of each of the first, second and third wavelength regions.

26. (*New*) A method for calculating an opacity value for an exhaust emission plume, the method comprising:

obtaining an measurement of an exhaust constituent amount (n) in a spatial volume of an exhaust emission plume;

directing a beam of substantially monochromatic electromagnetic radiation substantially through the spatial volume of an exhaust emission plume;

measuring a transmittance (T) of the beam of substantially monochromatic electromagnetic radiation;

calculating an opacity value (K_s) proportional to the relation

$$K_s = \frac{\ln\left(\frac{1}{T}\right)}{n}.$$

27. (*New*) The method of claim 26, wherein the measurement of an exhaust constituent amount comprises a measurement of an amount of carbon dioxide (n_{CO2}).

28. (*New*) The method of claim 26, wherein the beam of substantially monochromatic electromagnetic radiation comprises a beam of substantially ultra-violet radiation.

29. (*New*) A system for determining an opacity value for an exhaust emission plume, the system comprising:

an exhaust constituent amount measuring system that measures an exhaust constituent amount (n) in a spatial volume of an exhaust emission plume;

a source of substantially monochromatic radiation capable of forming a beam of radiation;

a transmittance measuring system that measures a transmittance (T) of the beam of radiation; and

a processor further comprising an opacity calculation module that calculates an opacity value (K_s) according to the relation

$$K_s = \frac{\ln\left(\frac{1}{T}\right)}{n}.$$

30. (*New*) The system of claim 29, wherein the source of substantially monochromatic radiation produces ultra-violet radiation.

31. (*New*) The system of claim 29, wherein the exhaust constituent amount measuring system measures an amount of carbon dioxide (n_{CO2}).

32. (*New*) The system of claim 29, wherein the exhaust constituent amount measuring system measures an amount proportional to the sum carbon monoxide and carbon dioxide ($n_{CO} + n_{CO2}$)